

# Linear Transformer Drivers for Propulsion and Power

Completed Technology Project (2015 - 2016)



## Project Introduction

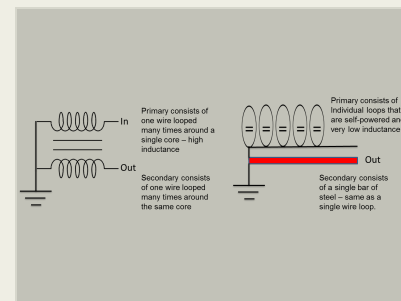
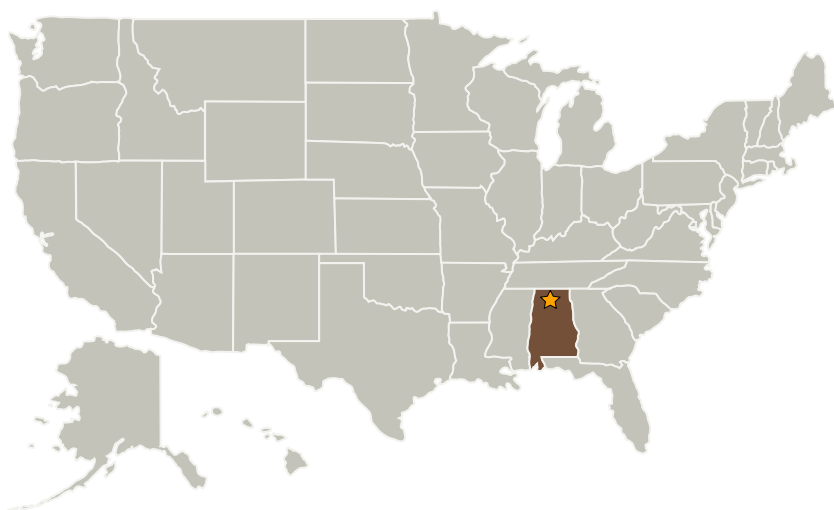
Explore a variant of the linear transformer driver (LTD) concept being developed by Sandia Laboratories and University of Michigan, with the following differences: (1) Use smaller capacitors, for smaller bricks; (2) Assemble into much smaller cavities; (3) Add layers to the stack, introducing the super-cavity and super-stack. The rationale for this approach is to maintain as much of the LTD at lower voltage levels as possible, to eliminate the need for submerging components in oil or other arc retarding media, and to reduce weight. Also allows spreading components out as much as packing efficiency allows, to dissipate thermal energy. Efforts in Year 1 was focused on demonstration of LTD cavity. Year 2 will focus on stack demonstration, including cavity optimization, simultaneous operation of multiple cavities, voltage addition, and testing in vacuum.

## Anticipated Benefits

Construct prototypes of revolutionary linear transformer driver technology for application to pulsed electric propulsion systems, or rail gun/launch assist systems. The eventual goal is to implode a fusion target.

Potential applications for this technology include electric propulsion systems or electric rail guns.

## Primary U.S. Work Locations and Key Partners



Comparison of Transformer and Linear Transformer Driver

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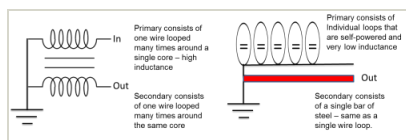


Organizations Performing Work	Role	Type	Location
★ Marshall Space Flight Center (MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Boeing Research & Technology	Supporting Organization	Industry	
University of Alabama in Huntsville (UAH)	Supporting Organization	Academia	Huntsville, Alabama

## Primary U.S. Work Locations

Alabama

## Images

**LTD Figure 1**

Comparison of Transformer and Linear Transformer Driver

(<https://techport.nasa.gov/image/6614>)

## Project Website:

<https://www.nasa.gov/directorates/spacetech/home/index.html>

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Marshall Space Flight Center (MSFC)

**Responsible Program:**

Center Innovation Fund: MSFC CIF

## Project Management

**Program Director:**

Michael R Lapointe

**Program Manager:**

John W Dankanich

**Principal Investigator:**

Robert B Adams

**Co-Investigator:**

Leo L Fabisinski

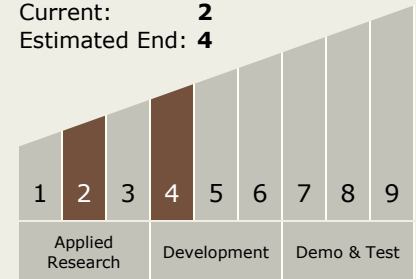
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## Technology Maturity (TRL)

Start: 2  
Current: 2  
Estimated End: 4



## Technology Areas

### Primary:

- TX01 Propulsion Systems
  - └ TX01.4 Advanced Propulsion
    - └ TX01.4.4 Other Advanced Propulsion Approaches